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XXXV.—*On a remarkable Fish of the Family of Sturgeons discovered by M. A. P. Fedchenko in the River Suir-dar.*
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AMONG the fishes brought by A. P. Fedchenko in 1871 from Turkestan there was one which, in many respects, deserves special attention. This fish belongs to the family of sturgeons, but differs much from all the species of the genus *Acipenser*, in which Russia is so rich, and greatly resembles one of the species of the North-American sturgeons, fully described some time ago by the well-known Viennese ichthyologist Heckel under the name of *Scaphirhynchus Rafinesquii*. The affinity between the specimen discovered by M. Fedchenko and the above-named North-American fish, in spite of a few differences, is on the whole so great that, in my opinion, these fishes belong to one and the same genus; and accordingly I propose to call our Turkestan fish *Scaphirhynchus Fedtschenkoi*.

I proceed now to the description of this new species.

Generic Characters of Scaphirhynchus.—The body is fusiform, the fore part rather thick. The broad head ends in a more or less long spade-like snout; the transverse mouth, situated on the lower side of the head, does not contain any teeth, but is surrounded by a fleshy, eight-lobed, tubercular lip; in front of the mouth, but at a little distance from it, there are placed in a transverse series four barbels; the so-

* Translated by J. T. Naaké, Esq., Assistant in the Department of Printed Books, British Museum, from the Russian text in *Mém. Soc. d'Hist. Nat. Mosc.* vol. x. 1872.

called spiracles are wanting. Down the body there are five rows of scutes, of which the upper (dorsal) row ends at the commencement of the dorsal fin, and the abdominal rows at the base of the ventral fins, the lateral rows extending to the end of the tail. The tail, behind the dorsal and anal fins, is slightly flattened and completely covered with ossaceous scutes; the end of the tail terminates in a more or less long filament.

Specific Characters of Scaphirhynchus Fedtschenkoi.—The length of the spade-like snout is subject to great variation, but never less than three fourths of the whole length of the head, or less than one fourth of the length of the whole body to the base of the caudal fin; the barbels are not fringed, placed in a curved line, and are distant further from the end of the snout than from the opening of the mouth; the diameter of the little eyes does not exceed 2 millimetres; the distance from the anus to the commencement of the anal fin is a little greater than that from the end of the anal fin to the beginning of the caudal.

Detailed description.—The length of the snout, together with that of the whole head, is subject to very great variation. In some of those specimens which might be called short-snouted the length of the head consists of a little more than one third of the length of the whole body to the base of the caudal; in others with long snouts the length of the head is as much as four ninths of the length of the whole body. The breadth of the head at the gill-openings is contained in the length of the body (without caudal) from seven to eight times, the breadth of the basal part of the snout being a little greater than that of the head at that point. The head is flat-convex above, quite flat below. The snout has the shape of a more or less long spade, which from the centre to the margins gradually becomes thinner, and from the base to the end both thinner and narrower. The end of the snout is sharp, rounded, and the margins are rather soft, in consequence of which they slightly bend inwards in dried specimens, giving to the snout the appearance of a shallow gutter. The posterior ends of the margins of the snout form two bony prominences or hooks, directed towards the gill-covers. A little in front from these hooks is the widest part of the snout; and behind them, close to the gill-covers, the breadth of the head is a little smaller than that of the snout.

The whole upper surface of the head is covered with shields, which, however, are less prominent and less distinct than in the American species—the less so, as they are covered with a thick layer of skin forming many longitudinal folds. There are seven principal shields—one occipital, two parietals, two

frontals, and two temporals. The small occipital shield is almost of a triangular form, with a scarcely observable longitudinal ridge, and with its anterior acute end deeply buried between the two parietals. The central points of the parietals are almost opposite to the front margin of the gill-covers, and appear as very slight elevations; the interspace between these central elevations is slightly hollow, like a shallow gutter, and its breadth is considerably less than that of the interspaces between each central elevation and the corresponding gill-cover. Outside of the parietals there are the flat temporals, whose central points are in a diagonal line with the central elevations of the parietals. Posteriorly the parietals, as well as the temporals, rest against the upper dorsal shields, which, like the temporals, are completely flat. The slightly projecting central points of the frontal shields are opposite to the front border of the eye. On the outer side of the frontal shields there are two little cavities, at the bottom of which the frontals are separated from the supraciliary shields by a little narrow membranaceous interspace. The interspace between the frontals is partly occupied by the acute front ends of the parietals, and partly by a separate odd interfrontal shield. In front of the above-named shields the whole of the upper part of the snout is covered with elongate lanceolate shields, which gradually become smaller and thinner and more difficult to distinguish. Between them, towards the margins of the snout, there are skinny interspaces, mostly of irregular oval shape and of various sizes, and occupied by those peculiar organs which are called by Heckel "Schleimdrüsen" (mucous glands).

The lower side of the snout is completely flat; only in dried specimens the borders of the snout are turned inside, and give it the shape of a shallow gutter. There may be seen sometimes in the centre of the lower side of the snout a longitudinal prominence, caused by a bony rib passing there. The whole of the lower side is covered by a thick soft skin containing a dense network of folds, in the loops of which are little pores crowded together (according to Heckel the openings of the mucous glands). Four completely smooth barbels, situated on the lower side of the snout, are placed in a transverse, slightly curved line. The outer barbels are from two to three times as long as the inner, and when adpressed to the snout they reach to the mouth. The interspace separating the two inner barbels is almost twice as wide as that between each inner and outer barbel. The outer barbels are generally close to the margin of the snout: their distance from the end of the snout is the greater the longer the snout; but even in short-snouted

specimens it is greater than the distance from the opening of the mouth.

At the hinder end of the snout, opposite its lateral hooks, there is the transverse mouth, placed in a separate transverse cavity. The breadth of the mouth is equal to about half that of the whole snout. Both lips, the upper and lower, are divided in the middle by a notch into two curved halves. In front and on the sides the mouth is surrounded by a tubercular fleshy pad; but in the lower lip there is in the middle a wide interspace between the two halves of this pad. Interiorly both lips are furnished with two rows of small soft warts; the palate and the tongue are also supplied with similar warts placed in more or less regular transverse rows. Moreover there are also three transverse folds on the palate (*Scaphirhynchus Rafinesquii* has four folds in the palate), of which the front one is curved towards the front, and the posterior backwards.

The eyes, which are almost opposite to the front margin of the cavity of the mouth, are exceedingly small, so that their diameter (not exceeding 2 millimetres) is contained not less than fifteen times in the breadth of the interspace between them. In front of them there are the two nasal openings. The upper nasal openings have an oval form, and their diameter is half that of the cleft of the lower. Each of the lower nasal openings is provided from the front side with a tolerably broad skinny flap. The two nasal openings of each side are more approximate to each other with their hinder parts, which are directed obliquely towards the upperside of the head.

The gill-cavity is considerably shorter and the gill-openings are slightly shorter than those of *Scaphirhynchus Rafinesquii*. Each of the gill-covers is composed of two bony pieces: the upper one, which is the larger, reaching almost to the gill-opening, is rather rough, sometimes provided with a longitudinal central ridge; the other (lower) one is smaller and almost completely smooth (comparatively larger than that of *Scaphirhynchus Rafinesquii*). The interspace which divides at the throat the two gill-openings is a little wider than that in the American species, and is not less than one half of the transverse diameter of the mouth.

Two bony laminae (suprascapulary and scapulary) border the upper part of the gill-opening. The former has an irregular square form, and is a little larger than the latter, which is almost triangular. Both of these laminae are rough, but not provided with projecting teeth as in *Scaphirhynchus Rafinesquii*. The two clavicles meet in the central line, and form one broad transverse shield, with two anterior lateral excisions corre-

sponding to the gill-openings, and one central posterior notch of a triangular form. Each of the clavicles is provided with numerous small ridges, of which one, longitudinally passing through the centre of the clavicle, projects beyond the rest.

The body gradually becomes thinner behind; at the same time, in the whole of its length, the vertical diameter remains equal to the transverse diameter. The five rows of scutes which pass along the body render its shape a little angular. The extreme end of the tail, from the dorsal and anal fins, is entirely covered with scutes, but much shorter than in *Scaphirhynchus Rafinesquii*. The trunk of the tail of our Turkestan species (*i. e.* the distance from the end of the anal fin to the base of the caudal) is scarcely one seventh of the distance from the front margin of the clavicle to the base of the caudal, whilst the trunk of the tail of the American species is not less than one fourth of the above-named distance. The distance from the base of the caudal to the anus of the former species is to the distance from the anus to the front margin of the clavicle as 2 : 3, whilst these two distances are almost equal to each other in the other species.

Down the dorsal ridge, from the neck to the base of the dorsal fin, there is a row of saddle-like scutes, numbering from seventeen to eighteen; they are closely set, and each of them is supplied with a projecting longitudinal crest ending behind in a sharp hook. The first scute, immediately adjoining the occipital shield, is the largest of all, and of an irregularly triangular form; the second is smaller and shorter than all the rest following it, which, again, gradually become larger and longer than wide. Likewise also the crests become gradually higher and their terminal hooks longer. The base of each of the scutes is concave.

The lateral rows of scutes commence from the suprascapulary, extend to the base of the caudal fin, and consist of from forty-two to fifty-seven pieces; they are tolerably closely set, and have an irregular obliquely rhomboid form, with a longitudinal projecting crest along the centre. The crests of these scutes, as the crests of the dorsal scutes, terminate in acute spines. At the base of the posterior end of the shoulder-blades there is a small hollow place. The scutes of the side rows, from the first to the fifteenth (approximately), gradually get larger, then for a considerable space they retain almost the same size; and only those approaching the base of the caudal fin again gradually diminish in size; but they do not become so narrow and flat as in *Scaphirhynchus Rafinesquii*.

In each of the abdominal rows there are from seven to nine scutes; but it happens sometimes that in one row (sometimes

the right, and sometimes the left) there are one or two scutes more than in the other; they begin at a little distance behind the pectoral fins, and extend to the base of the ventrals. The scutes are a little like the dorsal; but their crest is somewhat less developed, and appears generally as a ridge without the hook; only in young specimens the crest is comparatively higher and ends in a spine. The anterior are frequently very small and a little removed from the others, which are more or less closely joined together.

The scutes of all the rows, as well as the interspaces between the rows, are more or less covered with a thick soft skin, in which are imbedded bony corpuscles looking like small thorns or longitudinal ribs, in consequence of which the whole of the skin appears rough. Only behind the ventrals scutes begin to appear on the skin, which gradually increase in size and become imbricate, so that the whole of the tail is surrounded by them. The largest of these scutes occupy the space between the anus and the beginning of the anal fin, and are placed in pairs (four or five pairs), with the exception of the last one, which is single, oblong, and directly joins the anal fin. At the front margin of the anus there are no scutes of any kind. Four pairs of thick scutes occupy the space between the end of the anal fin and the beginning of the caudal; towards the centre this space appears to be slightly concave, like a shallow gutter. Four pairs of flat scutes cover the dorsal side of the tail (which is slightly flat) from the posterior end of the dorsal fin to the beginning of the row of fulcra covering the upperside of the thin end of the tail opposite to the caudal. Of these fulcra the three anterior are more or less flat, laminate. The whole of the base of the dorsal fin is surrounded on both sides with narrow, almost lanceolate bony scutes.

The fins, both paired and single, are very much like the corresponding fins of the fishes of this family. The front rays of the fins are simple, and the posterior more or less branched. The first outer ray of the pectorals differs very little in diameter from the others; only it is considerably thicker at the base. The fins themselves are very broad, and their hind margin is round. The ventral fins, which are considerably narrower, are also round at the end. The dorsal fin has a rhomboid form; the anal fin is more rounded, square; and the caudal fin has the shape of a broad triangle. In each of the pectoral fins there are from thirty-six to forty rays, and in each of the ventrals from eighteen to twenty; the dorsal contains from thirty to thirty-four, the anal from nineteen to twenty, and the caudal fin from sixty to seventy rays. The end of the tail ends in a more or less thin filament; and it is necessary

to note that the shorter the snout the longer is the caudal filament.

The colour of the upperside of the fish (judging by the specimens preserved in spirits of wine) is pale brownish grey, light yellow below. All the fins are light grey. There are no dark stripes or spots either on the body or the fins.

The internal parts of *Scaphirhynchus Fedtschenkoi* are exactly like the corresponding parts of *S. Rafinesquii* described by Brutzer; consequently I will notice a few of them only.

The vertebral column, from the occiput to the base of the caudal fin, consists of about fifty-five vertebrae, of which thirty are abdominal and twenty-five caudal.

The supplementary gills, consisting of two parts and placed round the back margin of the gill-covers, are perceptibly less developed than those of *Acipenser*.

The nasal cavities are very spacious and pierced by the olfactory nerve. From the place of its entrance into the cavity there radiate about twenty folds of mucous membrane, of which the lower ones, having almost a vertical direction, are perceptibly longer and thicker than the upper, which are almost horizontal.

A tolerably long intestinal tract makes several convolutions, and is divided into an œsophagus, first stomach, second stomach, small intestine, spiral valve, and rectum. The first stomach is rather long and curved in front, so that it is easy to distinguish in it the receiving and discharging portions; its greatest diameter is nearly in the middle, at the point of the curve; towards the end it becomes narrower. The second stomach is muscular; it forms a loop with the end of the first stomach, and has the shape of a short cone. At the commencement of the small intestine, which passes out of the left side of the muscular stomach, there is an oval slightly spatulate branch, corresponding in all probability to the appendices pyloricæ of other fishes. Further towards the end the small intestine makes a convolution, passing into the part which contains the spiral valve. This last is tolerably thick at the beginning, but gets gradually thinner towards the end; it is perfectly straight, and finally enters into the narrow rectum. The spiral valve has five turns.

In a specimen, the total length of which was 235 millims. and the distance from the mouth to the anus 72 millims., the length of the entire intestine was 109 millims.—that is, to the œsophagus 16 millims., the first stomach 30 millims., the second 11 millims., the small intestine 26 millims., and the spiral valve together with the rectum 26 millims.

The narrow kidneys are situated on the sides of the vertebral

column, and extend almost along the whole length of the abdominal cavity, and are everywhere separated, except at the hinder end, where they coalesce. A small urine-bladder is provided in front with two long spacious horns; in a bladder 5 millims. long the horns are 27 millims. long. The diameter of the roe when nearly mature is about 1.5 millim. (from 1.3 to 1.8 millim.), the roe being of a brownish-yellow colour. In a specimen 230 millims. long I counted in both ovaries about 1500 eggs.

But the most interesting organ of our fish is its swimming-bladder. It is quite rudimentary, a small bag-like appendage to the stomach (in a specimen 235 millims. long the swimming-bladder was 9 millims. long and 4.3 millims. wide), to which it is joined by a short tube. This tube begins at the front end of the bladder, and enters at the commencement of the first stomach from the dorsal side at the distance of 1 millim. from the end of the œsophagus. The position of the bladder between the stomach and the vertebral column is normal; its walls consist of the same membranes as those of the first stomach.

For the cause of such a peculiar development or, rather, malformation of the swimming-bladder in the *Scaphirhynchus Fedtschenkoi* we must search, in all probability, in the mode of life of this fish. There is no doubt (at least I think so) that this fish is obliged to live continually at the bottom of the river, and there burrows in the sand or mud in order to get its food. This is evident from the shape and structure of its snout as well as the smallness of its eyes, which have become almost rudimentary. Indeed I found in the stomach of our fish exclusively the remains of creatures living in mud. It is known that the swimming-bladder is wanting in those fishes only which are in the habit of living at the bottom of the water (viz. rays, soles, lampreys, &c.).

The fish described by us was discovered by M. A. P. Fedchenko in the river Suir-dar. According to his notes the native fishermen do not consider it to be a distinct species, but merely look upon it as the young of the sturgeon of the Aral Sea. Evidently they do so in consequence of its normally small size. Out of the twelve specimens brought by M. Fedchenko the largest were only 8½ inches long (exclusive of the caudal filament); among them there were some females with eggs almost completely matured. This is no doubt the reason why this fish escaped the notice of former travellers who had visited the banks of the river Suir-dar.